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CLATHRUS CIBARIUS, THE
"BIRD-CAGE FUNGUS."

BY
G. H. CUNNINGHAM.

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CLATHRUS CIBARIUS, THE "BIRD-CAGE FUNGUS."

By G. H. CUNNINGHAM.

THIS fungus, known variously as "basket fungus," "lattice fungus," "Devil's purse," "*tutae whetu*," and "*tutae kehua*," belongs to the Phallaceae, a family included in the Basidiomycetes. It is found commonly throughout New Zealand during the late autumn and early spring, and appears to be partial to grassy places and freshly deposited earth on roadside cuttings; it is not confined to these localities, however, as it is frequently to be seen growing amongst decaying leaves on the forest-floor. It appears shortly after heavy rains.

The genus *Clathrus* occurs in Australasia, Ceylon, South America, the southern parts of North America, Africa, Europe, and in many of the tropical islands. In New Zealand it is represented by the subject of this paper.

CLATHRUS Micheli, *Nova Plant. Gen.*, p. 214, 1729.

Receptacle sessile, enclosed when immature in a three-layered volva, at maturity latticed, hollow, globose to obovate; arms of receptacle variously shaped, rough or smooth, tubular or cellular in structure. *Volva* at first obovate, at maturity cupulate with apex irregularly lacerate, consisting of three layers, exo-, meso-, and endo-peridium; the mesoperidium thick, gelatinous, and divided into a few large polygonal areas. *Gleba* lining inner surface of receptacle, gelatinous, coloured, fetid. *Spores* globose to elliptical, coloured.

Clathrus cibarius (Tul.) Ed. Fisch, *Sacc. Syll.*, vol. 7, p. 20, 1888.

Ileodictyon cibarium Tulasne, *Ann. Sci. Nat.*, p. 114, 1844.

Clathrus Tepperianus Ludw., *Bot. Centr.*, p. 5, 1890.

Ileodictyon giganteum Col., *Trans. N.Z. Inst.*, vol. 25, p. 324, 1892.

Receptacle sessile, white, subglobose or more commonly obovate, attaining a size of 15 cm. high, 10 cm. wide; composed of numerous obliquely anastomosing bars; bars smooth, or frequently pitted with numerous small, angular depressions; in section elliptical, tubular, or more frequently coarsely and irregularly cellular, 5–10 × 4–6 mm. diam., not or scarcely thickened at intersections (though in some forms attaining a thickness twice that of the bars). *Volva* dingy-white, obovate, with an irregularly lacerate apex, becoming at maturity cupulate, consisting of three layers—a thin tough white exoperidium, a thick (up to 7 mm.) gelatinous mesoperidium, and a delicate hyaline endoperidium—the two inner layers divided into several polygonal segments by cross-walls, corresponding with the arms of the receptacle. Attached to substratum by a few coarse, white, basal mycelial strands. *Gleba* covering inner surface of arms of receptacle, olivaceous, gelatinous, fetid. *Spores* embedded in gleba, olivaceous, elliptical, rounded at both ends, 6 × 4 μ .

Habitat.—Growing solitary or caespitose in open grassy places, newly formed roadside embankments, or amongst dead leaves on forest-floor.

Distribution.—Australia; Chile; common throughout lowland areas of New Zealand.

This species was originally described as an *Ileodictyon* by Tulasne, being placed by him in that genus because the arms of the receptacle were supposed to be tubular, whilst those of *Clathrus* were supposed to be coarsely cellular. This distinction does not hold with our species, however, as forms commonly occur which are obviously *C. cibarius*, yet possess cellular arms. As a rule the smaller forms have tubular arms, whilst the larger show the cellular structure.

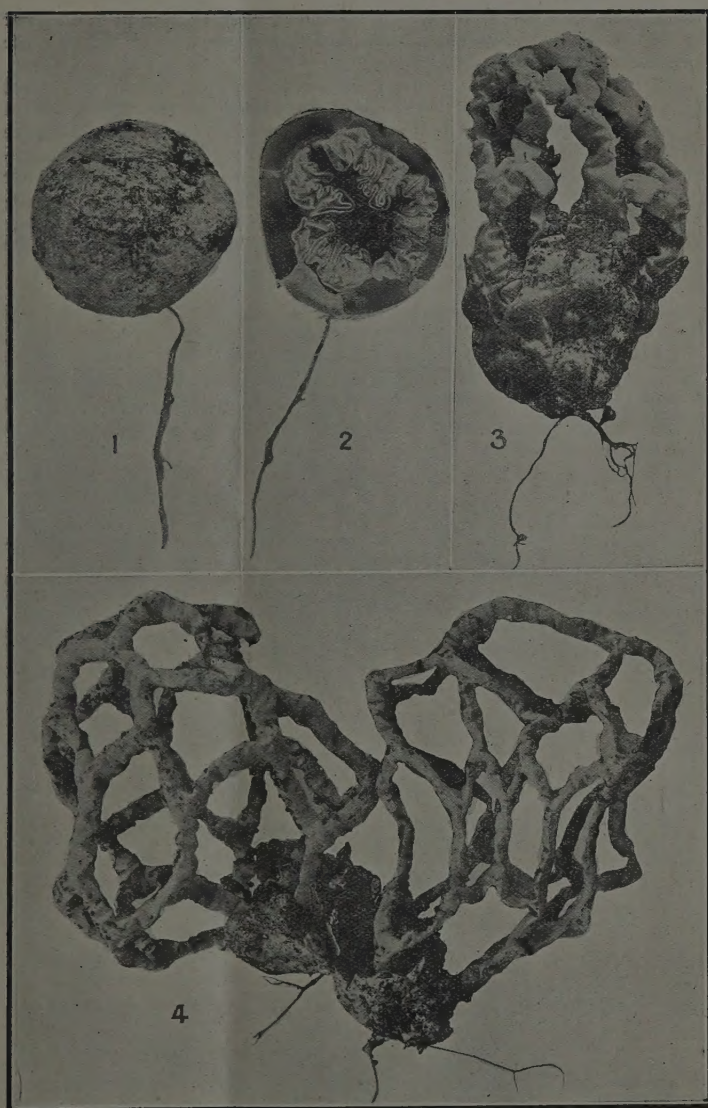
It is closely related to the Australian *C. gracilis* Schl., but differs chiefly in the larger elliptical arms and larger size of the receptacle.

LIFE-HISTORY.

From coarse mycelial strands which ramify in the substratum the volva, containing the receptacle, is developed. This at first is subterranean, but as it approaches maturity it comes to the surface of the ground, where it appears in the form of a dingy-white obovate "egg," which may attain a diameter of from 4 to 6 cm. The egg consists of two systems, the cortical and the medullary. The cortical system gives rise to the outer layer (exoperidium) of the volva, and to the receptacle. The medullary system gives rise to the gelatinous layer (mesoperidium) and the inner layer (endoperidium) of the volva, and to the gleba. When a median section is cut through the egg shortly before it reaches the surface it presents the appearance shown in fig. 2. The outer envelope of three layers is the volva, which is seen to be divided into several polygonal segments. Within the volva lies the receptacle, at this stage much convoluted, in turn enclosing the gleba, which consists of a brown cellular mass, completely filling the cavity enclosed within the receptacle. When examined under the microscope the gleba is seen to consist of a cellular structure formed of closely woven hyphal filaments. The inner walls of the cavities are lined with the hymenium, consisting of basidia and paraphyses arranged in columnar masses. The spores are sessile, six being borne on each basidium. At this stage the fungus does not possess the fetid odour characteristic of this species.

Prior to the rupture of the volva, the filaments, paraphyses, and basidia constituting the gleba gelatinize, the spores becoming embedded in the jelly-like matrix so formed. Owing to the pressure exerted by the developing receptacle, &c., the volva becomes ruptured at its apex, the suture following the septa of the irregular segments into which the volva is divided, and, the pressure being thus suddenly released, the receptacle rapidly expands, ultimately becoming several times as large as it was previous to the rupture of the volva. This rapid enlargement is due not to cell-division, but to the folds, into which the receptacle was thrown whilst within the volva, suddenly straightening out, so that in a mature plant the arms of the receptacle are quite smooth. The inner surface of the receptacle is at this stage lined with the gelatinous gleba in which the spores are embedded.

It now possesses a most fetid odour, resembling somewhat that of decaying fish, which serves to attract insects, particularly blow-flies. These appear to relish the fetid mass, as they frequently may be seen feeding on it. The deliquescence of the gleba, conspicuous nature of the receptacle, and fetid odour are devices on the part of the fungus to ensure insect-visitation and so secure dissemination of its spores, as it has been shown that the excreta of flies which have fed on the gleba contain enormous numbers of spores. Furthermore, experiments have shown that these



Clathrus cibarius (Tul.) Ed. Fisch.

[E. Bruce Levy. photos.]

FIG. 1.—Egg (natural size).

FIG. 2.—Egg. Section showing convoluted receptacle (natural size).

FIG. 3.—Plant two hours after rupture of volva (reduced one-half).

FIG. 4.—Mature plants (reduced one-half).

spores germinate readily (usually in about two months), and in fact appear to do so more readily than spores that have not passed through the alimentary tract of flies.

The receptacle in the mature plant is not attached to the volva, but merely partly contained within it, and is thus readily detached and carried by the wind some little distance from its place of origin. The appearance of these peculiar lattice-like structures without any visible means of attachment to the substratum have led to many curious conjectures as to their origin. To the Maori they were ever a source of wonderment and speculation. Forced to find some explanation of their (to him) mysterious appearance, and guided no doubt by their characteristic odour, he came to the conclusion that they were *tutae kehua* (literally, "faeces of ghosts") or *tutae whetu* ("faeces of the stars").

The specific name (*cibarius* = eatable) of our plant was applied to it from the belief that the fungus was used as an article of food by the Maori. Mr. Elsdon Best (to whom I am indebted for the names applied by the Maori to this species) informs me that to his knowledge it was not included among those fungi considered edible, and that, moreover, owing to its supposed supernatural origin, it is highly improbable it would be used in this manner.

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